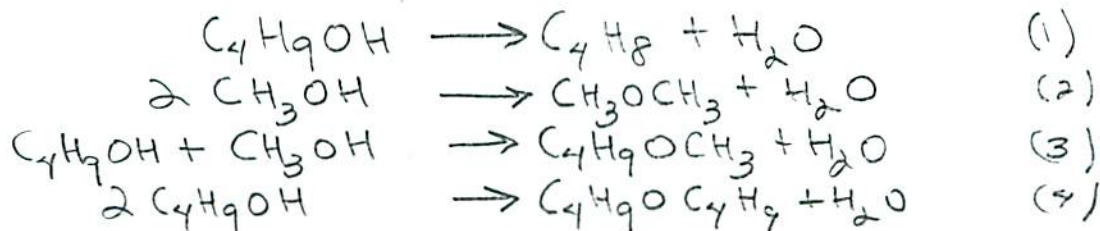


Problem S-8

(Problem 1-7)



Stoichiometric Table (Basis: 8,333 moles B/hr. inlet)

Species	Inlet (moles/h)	Effluent (moles/h)
$\text{C}_4\text{H}_9\text{OH}$	8,333	$8,333 - \xi_1 - \xi_3 - 2\xi_4$
CH_3OH	16,667	$16,667 - 2\xi_2 - \xi_3$
C_4H_8	—	ξ_1
H_2O	—	$\xi_1 + \xi_2 + \xi_3 + \xi_4$
CH_3OCH_3	—	ξ_2
$\text{C}_4\text{H}_9\text{OCH}_3$	—	ξ_3
$\text{C}_4\text{H}_9\text{OC}_4\text{H}_9$	—	ξ_4
N_2	10,000	10,000
Total	35,000	$35,000 + \xi_1$

Data:

$$\text{C}_4\text{H}_8(\text{out}) = 2923 \text{ moles/hr.} = \xi_1$$

$$\text{CH}_3\text{OCH}_3(\text{out}) = 3436 \text{ moles/h} = \xi_2$$

$$\text{C}_4\text{H}_9\text{OCH}_3(\text{out}) = 5038 \text{ moles/h} = \xi_3$$

$$\text{C}_4\text{H}_9\text{OC}_4\text{H}_9(\text{out}) = 22 \text{ moles/h} = \xi_4$$

$$\text{C}_4\text{H}_9\text{OH}(\text{out}) = 8,333 - 2,923 - 5,038 - 2(22) = 328 \text{ moles/h.}$$

$$X_{\text{isobutanol}} = \frac{8333 - 328}{8333} = 0.961$$

(2)

$$CH_3OH \text{ (out)} = 16,667 - 2(3436) - 5038 = 4757 \text{ moles/h.}$$

$$X_{MeOH} = \frac{16,667 - 4,757}{16,667} = 0.715$$

$$Y_{H_2O} = \frac{\sum_1 + \sum_2 + \sum_3 + \sum_4}{35,000 + \sum_1} = \frac{2923 + 3436 + 5038 + 22}{35,000 + 2923}$$

$$Y_{H_2O} = 0.301$$